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Innovation of Biofertilisers-Organic Based Nutrients Management and Water Saving Technology to Secure Rice Productivity

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Abstract

Indonesian's food security is hazardous due to rapidly growing population, soil health degradation and water scarcity problem. Since 2007 different nutrient management techniques have been developed (1) biofertilisers inoculant (consortia of *Azotobacter* sp, *Azospirillum* sp, *Pseudomonas* sp and *Bacillus* sp), (2) decomposer inoculant (consortia of *Streptomyces* sp, *Cytophaga* sp, *Bacillus* sp, and *Trichoderma* sp) for composting rice straw, (3) organic ameliorant (75–90 % of straw compost + 10–25 % of rice husk biochar). These techniques were introduced as an integrated organic-biofertilisers based nutrients management and water saving technology, known as SOBARI (system of organic based aerobic rice intensification). This technology should remediate the soil health, reduce the inorganic fertilisers uses, increase the efficiency of water irrigation use and to increase the rice production in sustainable ways. The SOBARI uses efficient water condition from muddy to –5 to –10 cm as indicated at the water gauge of the water level indicator, it uses young seedlings (12–15 days), a widely planting space (30 cm × 30 cm or 30 cm × 35 cm), two single seedlings are planted at each planting cross section with a distance of 5 cm, and it further uses 2–5 ton ha⁻¹ organic ameliorant and 500 – 1000 g ha⁻¹ of biofertilisers inoculant. The field experiments and demo plots results from 2007–2015 at different locations (provinces) in Indonesia revealed that (1) the SOBARI as integrated water saving technology increased the efficiency of water irrigation uses by 35 %, (2) twin seedling planting technique of SOBARI increased the rice grain yield by 20–30 % as compared to conventional methods, (3) application of 2–5 ton ha⁻¹ of organic ameliorant and biofertilisers reduced the application of inorganic fertilisers by 25–50 %, improved soil health (soil organic carbon, nutrients status in soils) significantly, and increased the rice productivity by 50–200 %. Therefore, SOBARI has a great prospect to increase the rice productivity from 5–6 ton ha⁻¹ to 6–8 ton ha⁻¹ of grain yield relatively easy nationwide for securing the food resilience in Indonesia.

Keywords: Biofertilisers, food security, organic fertilisers, SOBARI, straw compost